

The United States has ratified this STANAG and it is approved for use. Actual promulgation by NATO is expected within one year. At that time, this document will be replaced by the promulgated version. Any U.S. comments or reservations are included in the following letter.



ACQUISITION AND
TECHNOLOGY

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON DC 20301-3000

June 10, 2002



MEMORANDUM FOR U.S. MISSION TO NATO, ARMAMENTS COOPERATION DIVISION
(ARMY ARMAMENTS OFFICER), PSC 81, APO AE 09724

SUBJECT: Draft STANAG 4375 (EDITION 2) – “SAFETY DROP, MUNITION TEST
PROCEDURE ”

Reference document, AC/310-D/194, 12 December 2001, SAB.

The U.S. Armed Forces ratifies the referenced agreement.

Ratification and implementation details are as follows:

IMPLEMENTATION

	Forecast Date	Actual Date
<u>RATIFICATION REFERENCE</u>	<u>NAVY ARMY AIR FORCE</u>	<u>NAVY ARMY AIR FORCE</u>
Memo, OUSD(A&T) DATED AS ABOVE	June 10, 2002	June 10, 2002

NATIONAL IMPLEMENTING DOCUMENT: MIL-STD-2105C

RESERVATIONS: None

COMMENTS: None

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U.S. Key Delegate
AC/310 Main Group



CF:

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NATO/PfP UNCLASSIFIED

12 December 2001

DOCUMENT
AC/310-D/194

**GROUP ON SAFETY AND SUITABILITY FOR SERVICE (S3)
OF MUNITIONS AND EXPLOSIVES (AC/310)**

CNAD PARTNERSHIP GROUP (CPG)

**RATIFICATION DRAFT 1 - STANAG 4375 (EDITION 2) -
SAFETY DROP, MUNITION TEST PROCEDURE**

**Memorandum by the Assistant Secretary General for Defence Support
(RATIFICATION REQUEST)**

Reference: PfP(CPG-S/3-SG/3)DS/8 dated 30 November 2001

1. The Group on Safety and Suitability for Service of Munitions and Explosives, Sub-Group 3, approved, at reference, draft STANAG 4375 (Edition 2) for issue for ratification.
2. In line with the decision of the Group, the agreed text is herewith forwarded to delegations of NATO nations who are requested to obtain the national ratification by 15 June 2002. The delegations are asked to inform the Defence Support Division of their national Ratification references, together with a statement of the date by which national implementation is intended to be effective, using the ratification response form at Annex. The service or services within which the standard applies should be indicated.
3. Most national Ministries of Defence contain a standardization office or standardization liaison officer who can give advice on the procedure to be adopted to obtain a formal ratification reference. It is recommended that contact be made with that office.
4. As soon as sufficient ratifications have been received, this STANAG will be forwarded for promulgation.

(Signed) R. G. BELL

Enclosure:
1 Annex

Stanag 4375 (Edition 2)

Action Officer: R. Sladden
Original: English

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NATO/PfP UNCLASSIFIED

**NATIONAL REPLY ON THE RATIFICATION AND
IMPLEMENTATION OF A STANAG**

(National Reference and Date)

To : Assistant Secretary General for Defence Support
NATO/OTAN

Subject : STANAG 4375 (Edition 2) - RATIFICATION DRAFT 1 – SAFETY DROP, MUNITION TEST
PROCEDURE

Reference : AC/310-D/194 dated 12 December 2001

1. (nation) ratifies/does not ratify(*) the agreement received under cover reference.

2. Ratification and implementation details are as follows:

RATIFICATION REFERENCE AND DATE	IMPLEMENTATION					
	Forecast Date			Actual Date		
	NAVY	ARMY	AIR	NAVY	ARMY	AIR

3. NATIONAL IMPLEMENTING DOCUMENT(s):

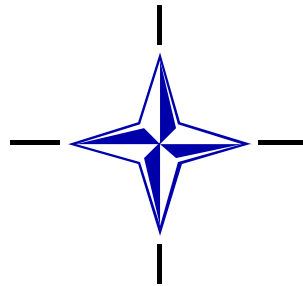
4. RESERVATIONS:

5. OTHER INFORMATION:

.....
(Signature block)

(*) Delete as appropriate

**NORTH ATLANTIC TREATY ORGANIZATION
(NATO)**



**NATO STANDARDIZATION AGENCY
(NSA)**

**STANDARDIZATION AGREEMENT
(STANAG)**

SUBJECT: SAFETY DROP, MUNITION TEST PROCEDURE

Promulgated on 2001

Jan H ERIKSEN
Rear Admiral, NONA
Director, NSA

Enclosure to
AC/310-D/194

STANAG 4375
(Edition 2)
(Ratification Draft 1)

RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Director, NSA under the authority vested in him by the NATO Military Committee.
2. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.
3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. Ratification is "In NATO Standardization, the fulfilment by which a member nation formally accepts, with or without reservation, the content of a Standardization Agreement" (AAP-6).
5. Implementation is "In NATO Standardization, the fulfilment by a member nation of its obligations as specified in a Standardization Agreement" (AAP-6).
6. Reservation is "In NATO Standardization, the stated qualification by a member nation that describes the part of a Standardization Agreement that it will not implement or will implement only with limitations" (AAP-6).

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

7. Page (iii) gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the tasking authority of its intentions. Page (iv) (and subsequent) gives details of reservations and proprietary rights that have been stated.

FEEDBACK

8. Any comments concerning this publication should be directed to NATO/NSA - Bvd Leopold III, 1110 Brussels - BE.

RATIFICATION AND IMPLEMENTATION DETAILS
STADE DE RATIFICATION ET DE MISE EN APPLICATION

N A T I O N S	NATIONAL RATIFICATION REFERENCE	NATIONAL IMPLEMENTING DOCUMENT	IMPLEMENTATION/MISE EN APPLICATION					
	REFERENCE DE LA RATIFICATION NATIONALE	DOCUMENT NATIONAL DE MISE EN APPLICATION	INTENDED DATE OF IMPLEMENTATION DATE ENVISAGEE DE MISE EN APPLICATION			DATE IMPLEMENTATION WAS ACHIEVED DATE EFFECTIVE DE MISE EN APPLICATION		
			NAVY MER	ARMY TERRE	AIR	NAVY MER	ARMY TERRE	AIR
BE								
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CZ								
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FR								
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UK								
US								

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NAVY/ARMY/AIR

NATO STANDARDIZATION AGREEMENT
(STANAG)

SAFETY DROP, MUNITION TEST PROCEDURE

Annexes: None.

Related documents:

AECP-1	Mechanical Environmental Conditions to Which Materiel Intended for Use by NATO Forces Could Be Exposed.
AECTP-200	Environmental Testing – Definitions of Environments
AOP-38	Glossary of Terms and Definitions Concerning the Safety and Suitability for Service of Munitions, Explosives and Related Products.
MIL-STD-2105B	Hazard Assessment Tests for Non-Nuclear Munitions.
STANAG 2895	Extreme Climatic Conditions and Derived Conditions for Use in Defining Design/Test Criteria for NATO Forces Materiel
STANAG 2914	Mechanical Environmental Conditions to which Materiel intended for use by NATO Armed Forces could be exposed (AECP-1).
STANAG 4123	Determination of the Classification of Military Ammunition and Explosives – AASTP-3.
STANAG 4297	Guidance on the Assessment of the Safety and Suitability for Service of Munitions for NATO Armed Forces – AOP-15.
United Nations Document (UN) ST/SG/AC.10/11/ Rev 3/R.256	Recommendation On the Transport of Dangerous Goods, Manual of Tests and Criteria (UN test 4 (b) (ii)).

AIM

1. The aim of the agreement is to provide a standard test procedure to assess the effect of unintentional drops of munitions.

AGREEMENT

2. Participating nations agree that the procedure incorporated in this STANAG will be used for assessing the reaction, if any, of munitions and weapon systems to accidental drops, and that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purpose of identification. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.

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DEFINITIONS

3. For the purpose of this document, the definitions of terms to be used to describe test events are provided in AOP-38.

GENERAL

4. Purpose. The main objective of this drop test is to determine if munitions can withstand severe shocks caused by drops onto a hard surface and remain safe for disposal.

DETAILS OF THE AGREEMENT

5. Application. This STANAG provides guidance and a procedure for drop tests. They should be conducted as a part of the evaluation of munitions by nations (see STANAG 4297). They may also be used for Hazard Classification (HC) as required by STANAG 4123, and other applications not covered by these STANAGs, but where the response of a munition to severe drops (12 m, or greater if otherwise identified as such in a life cycle profile) is required to be known. When intended to satisfy HC requirements, the test plans should be coordinated with appropriate authorities in this area.

6. Limitations. This STANAG does not specifically cover/address the following impact situations, however, information gained from the procedure herein may be of value in assessing such impacts:

- a. rough handling tests;
- b. drop tests to evaluate the ability of munitions to remain suitable for service;
- c. drop tests with a horizontal velocity component such as parachute drops or drops from moving vehicles;
- d. the impact of items falling on a munition;
- e. impact caused by jettisoning munitions from aircraft.

7. TEST FACILITY

- a. The test facility shall provide a release mechanism such that the test item can be reliably dropped from a given height onto a steel impact surface.
- b. Guidance system.
 - (1) The attitude at point of release shall be such as to ensure the test item impacts in/at the prescribed orientation.
 - (2) Various guidance systems that do not unacceptably reduce the impact velocity may be used to ensure a proper impact orientation. Such guidance systems must disengage at a sufficient time before impact to allow unimpeded fall and rebounding.
 - (3) If guidance systems are used which reduce the impact velocity, the drop height shall be adjusted to give the required free fall velocity.

c. Test surface

- (1) The impact surface shall be a smooth steel plate, at least 75 millimetres thick. It shall be sufficiently large to receive the dropped munition and, if possible, to accommodate any secondary impact, for example, from the munitions toppling. Its Brinnell hardness must be 200 or higher. The plate shall be bonded to, and supported throughout, by a minimum of 600 millimetres of reinforced concrete, of a minimum compressive strength of 28 kN/m², or 460 millimetres of crushed stone. The combination of concrete or crushed stone and the plate must be constructed such that no free water is retained on top of the plate. Any ice or debris shall be removed from the impact surface prior to testing. The plate shall be horizontal to within two degrees, and shall be positioned to facilitate safe handling of dropped munitions.
- (2) The plate surface shall be flat and level with the surrounding surface, and not deformed from previous impacts to the point that it affects the impact angles, or causes separation from the concrete support.
- (3) Existing drop facilities commonly consist of a large concrete block, effectively 20 times the mass of the test item, and faced with a steel plate. However, construction of new facilities should be in accordance with the above requirements.

d. Drop test facility and other equipment

<u>Facility</u>	<u>Requirement</u>
Temperature Chamber	Capable of pre-conditioning the test item to the extremes of temperature
Drop test facility	Tower, derrick, boom, etc., to achieve the required drop height and impact situations, and of sufficient stiffness to ensure a controlled drop
Quick-release mechanism	Capable of releasing the test item without imparting rotation
X-Ray equipment	As required

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TEST PROCEDURE

8. Procedure

- a. Drop Height: For reasons of standardisation, the minimum drop height for the logistic drop tests is 12m. This height may be increased appropriately if so identified in the life cycle profile.
- b. Test item configuration: The test item shall be in the most vulnerable drop configuration, either packaged or unpackaged, which represents the worst case situation derived from the Threat Hazard Assessment (THA). The test item must be to the full production standard, although non-explosive sections of the item need only be geometrically and structurally representative. For all-up rounds that contain more than one major energetic component (such as rocket motors and warheads), the energetic components may be tested either individually or as an all-up round.
- c. Impact surface: The test item shall be dropped onto a surface that meets the requirements of paragraph 7.c.
- d. Orientation and number of drops: Three separate drops, at different impact orientations, are required. Unless analysis, or previous test history, indicates differently, the following series of drops is commonly used. The test item, either packaged or unpackaged, is to be released such that it will approximate an initial impact in the following orientations:
 - major axis vertical, nose down ↓;
 - major axis vertical, base down ↑;
 - major axis horizontal, →;

Where more than one drop test is performed, these shall be carried out in order of decreasing likelihood of producing unwanted events. No test item shall be dropped more than once.

- e. Pre-conditioning: Any pre-conditioning of the test item for the test should simulate the likely worst case temperature conditions at the moment of a free fall in the service environment. The temperature to which the test item should be conditioned must be derived from the life cycle analysis, and should represent temperatures expected to make the test most sensitive to impact. If no actual data on service life environmental conditions are available, the levels stated in STANAG 2895 or AECTP-200 may be used as fallback levels for temperature conditioning. The time lapse between removal of the test item from the conditioning chamber and the drop test shall be sufficiently short to avoid unacceptable temperature change or icing on the item. When pre-stressing the test item at environmental severities to be encountered during operational use is expected to result in an increased sensitivity to impact, the test item should be pre-stressed prior to test. Environmental severities for pre-stressing can be developed from STANAG 2895 and 2914 (AECTP-1 or AECTP-200).

- f. Test controls and accuracy. The accuracy of the test parameters shall be as follows:

<u>Test Parameter</u>	<u>Tolerance</u>
Drop Height	1 %
Angular deviation of test item from the required position on impac	+/- 10 degrees
Test item temperature	+/- 5°C

OBSERVATIONS AND RECORDS

9. For HC determination, the following minimum observations are to be made and records kept:
- Test item identification (model, serial numbers, number of test items, etc.);
 - A record of events during the trial;
 - The nature of any reactions by the test item;
 - Listing of environmental preconditioning test performed;
 - Type of energetic material and weight;
 - Orientation of the test item at impact;
 - High-speed video recording;
 - Thermocouple data (versus time) for all sensors;
 - Identification of axes;
 - Previous tests to which the test item has been submitted.
10. The following photographic records and videos are to be made:
- Still photographs of the test item before and after each trial;
 - Colour cine film or video for the duration of each trial.

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IMPLEMENTATION OF THE AGREEMENT

11. This STANAG is considered to be implemented by a nation when that nation has issued the necessary orders / instructions:

- a. that all future munitions and weapon systems will be assessed / tested in accordance with this agreement;
- b. to provide its NATO forces with the details in this agreement with reference to this STANAG.

12. Data developed in accordance with this STANAG shall be made available to other NATO Nations participating in a collaborative weapon development or procurement program, upon receipt of a request submitted through appropriate National channels.